REMARKS

Claims 1, 4, 6-10, 12-13, 16-24, and 29 are pending in the present Application. Claims 16 and 17 have been amended, and claim 30 has been added, leaving claims 1, 4, 6-10, 12-13, 16-24, and 29-30 for consideration upon entry of the present Amendment.

Support for new claim 30 is found at least in claim 29 and in Examples 1-14 on p. 10, l. 7 to p. 13, l. 8 and Table 4.

Reconsideration and allowance of the claims are respectfully requested in view of the above amendments and the following remarks.

Allowable Claims

Applicants thank the Examiner for the indication of allowance of claims 10, 12-13, 18-21, and 23. However for reasons set forth below, it is believed that claims 1, 16-17, 22, 24, and 29-30 are independently allowable on other grounds.

Claim Rejections Under 35 U.S.C. § 103(a)

Claims 16 , 17, and 29 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Eisenhart *et al.*, U.S. Patent No. 5,137,571 (hereafter "Eisenhart") in view of Emmons *et al.*, U.S. Patent No. 4,079,028 (hereafter "Emmons"). Applicants respectfully traverse this rejection, at least to the extent that it applies to claim 29. Applicants have herein amended claims 16 and 17 to depend from allowed claim 13. Since claims 16 and 17 now recite all the limitations of allowed claim 13, Applicant submits that these claims are now allowable. Reconsideration and removal of the rejection of claims 16 and 17 is therefore requested. The Applicant's reasons for the patentability of claim 29 are set forth below.

Eisenhart generally discloses the reversible complexation of cyclodextrin compounds with the hydrophobic moieties of hydrophobic thickeners in the absence of organic solvents to suppress the viscosity of aqueous solutions of the thickener. The resulting complexes are decomplexed to permit the thickener to perform its intended function (Abstract). Hydrophobically modified polyurethanes, alkali soluble emulsions, hydroxyethyl cellulose, and polyacrylamides are disclosed (col. 1, ll. 28-34). α-, β-, and γ-cyclodextrins, and their hydroxyethyl- and hydroxypropyl-derivatives are also disclosed (col. 3, ll. 50-63).

Emmons generally discloses urethane thickeners having at least three low molecular weight hydrophobic groups at least two of which are terminal (external) hydrophobic groups. The polymers can be solubilized in water by use of a water miscible alcohol or surfactant (col. 2, ll. 44-58). Suitable diisocyanate starting materials for the polyurethanes are listed in col. 8, l. 55 to col. 9, l. 16. No mention is made of cyclodextrins of any kind.

The Examiner alleges that:

> It would have been obvious to one having ordinary skill in the art at the time the invention was made to select any of the hydrophobically modified polyethoxylated urethane thickeners taught by Emmons with a reasonable expectation of success because Eisenhart suggests their use.

(Office Action of 8/18/09, p. 3, second par.)

Applicants respectfully traverse. Nowhere in Eisenhart is there any teaching or suggestion to utilize the modified polyethoxylated urethane thickeners taught by Emmons. Eisenhart only states, "U.S. Pat. Nos. 4,155,892 and 4,079,028 [Emmons] are directed to polyurethane thickeners, characterized by at least three hydrophobic groups interconnected by hydrophilic polyether groups, formulated with organic solvents" in the "Description of the Prior Art" section of the specification (col. 1, ll. 59-62). No reference to Emmons can be found in the "Summary of the Invention" or the "Detailed Description of the Invention" sections of Eisenhart, and Emmons is not incorporated by reference. The only other reference to urethane associative thickeners (besides the examples) is in col. 1, ll. 28-30, where Eisenhart states that they are "known". Moreover, Emmons is silent on the use of cyclodextrins in combination with urethane associative thickeners.

The Examiner states that:

> It was established in the Office action of May 16, 2008 (page 3) that this thickener [QR-708] is a known product and is based on 4,4'-methylene-bis(isocyanatocyclohexane). This is also a diisocyanate suggested by Emmons.

(Office Action of 8/18/09, p. 3, fourth par.)

Applicants submit that it is precisely Eisenhart's specific and exclusive disclosure of 4,4'-methylene-bis(isocyanatocyclohexane) to the exclusion of all the other diisocyanates disclosed in Emmons that is a *teaching away* from the straight chain and branched chain diisocyanates of claim

29. There is no teaching or suggestion that any other urethane thickener besides one based on 4,4'-methylene-bis(isocyanatocyclohexane) can be used.

It is improper to combine references where the references teach away from their combination. *In re Grasselli*, 713 F.2d 731, 743, 218 USPQ 769, 779 (Fed. Cir. 1983). Moreover, as stated in MPEP 2141.02 VI, a prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983) cert. denied, 469 U.S. 851 (1984).

The only specific diisocyanate disclosed in Eisenhart is 4,4'-methylene-bis(isocyanatocyclohexane). Urethane thickeners based on this diisocyanate are taught in Example 1 (10 samples), Example 2 (4 samples), Example 3 (5 samples), Example 4 (24 samples), Example 5 (5 samples), and Example 6 (18 samples). Example 7 teaches hydrophobically modified alkali soluble emulsion thickeners, a hydrophobically modified hydroxyethyl cellulose thickener, and an unmodified hydroxyethyl cellulose thickener, not a urethane thickener of any kind. Applicants submit that Eisenhart's exclusive teaching of urethane thickeners based on 4,4'-methylene-bis(isocyanatocyclohexane), a *cyclic* diisocyanate, not those derived from straight chain or branched chain diisocyanates, in 66 compositions set forth in six examples, can be fairly and reasonable construed as a teaching away from urethane thickeners based on straight chain or branched chain (*acyclic*) diisocyanates.

As mentioned above, Emmons is relied on by the Examiner for the disclosure of a list of possible diisocyanate precursors to hydrophobically modified urethane thickeners. However no reason or motivation is provided in Eisenhart or Emmons to select only the straight chain and branched chain diisocyanates 1,4-tetramethylene diisocyanate, 1,6-hexamethylene diisocyanate, 1,10-decamethylene diisocyanate, and 2,2,4-trimethyl-1,6-diisocyanatohexane as recited in claim 29 from the extensive list disclosed by Emmons. In the 281 examples of hydrophobically modified urethane thickeners in Emmons, the vast majority of them are derived from 2,4-tolylene diisocyanate, 2,6-tolylene diisocyanate, methylene bis(4-cyclohexylisocyanate), and diphenylmethane-4,4'-diisocyanate. These diisocyanates are all cyclic or polycyclic, not straight chain or branched chain. Considering the disclosure of Emmons in its entirety, no motivation is provided to select straight chain and branched chain diisocyanates for urethane thickeners to the

exclusion of all others. The Examiner has not demonstrated any motivation for selecting specifically and exclusively urethane thickeners based on straight chain and branched chain diisocyanates from the list of at least twenty diisocyanates in col. 8, l. 55 to col. 9, l. 15 of Emmons when both cited references clearly teach away from straight chain and branched chain diisocyanates.

Even if a *prima facie* case of obviousness is made by combining Eisenhart and Emmons, the composition of claim 29 has unexpected beneficial properties. It is suprising and unexpected that the viscosity of aqueous solutions of the urethane thickeners derived from the straight chain and branched chain diisocyanates recited in claim 29 is suppressed more by cyclodextrins than the vicosity of aqueous solutions of urethane thickeners derived from cyclic or polycyclic diisocyanates is suppressed by cyclodextrins.

The consistent result of all of Examples 1-19 in the present application is that the viscosity of aqueous solutions of urethane thickeners derived from 1,6-hexamethylene diisocyanate (HDI), which is a straight chain diisocyanate, is suppressed more than the viscosity of aqueous solutions of urethane thickeners derived from (4,4'-methylene bis(isocyanatohexane, or Des W), which is a cylic diisocyanate, when they are combined with methyl-α-cyclodextrin or methyl-β-cyclodextrin. Comparative data can be found in Tables 1-4 on pp. 10-13. In order to emphasize these results, Tables 1-4 presenting test data are reproduced below.

TABLE 1

METHYL-β-CD WT%	THICKENER NORMALIZED VISCOSITY				THICKENER % SOLIDS
	HEUR1 w/ DES W (Ex 1)	HEUR2 w/ DES W (Ex 2)	HEUR3 w/ HDI (Ex 3)	HEUR4 w/ HDI (Ex 4)	
0 (comparative)	1	1	1	1	20
0.5	0.927	0.967	0.27	0.328	20
1	0.785	0.887	0.141	0.153	20
1.5	0.565	0.748	0.084	0.092	20
2	0.377	0.49	0.046	0.062	20
2.5	0.209	0.278	0.032	0.043	20
3	0.123	0.159	0.018	0.025	20
3.5	0.089	0.096	0.014	0.02	20

With respect to Table 1, note that for every amount of cyclodextrin, both urethane thickeners based on HDI exhibit greater viscosity suppression than both urethane thickeners based on Des W. In no case is the normalized viscosity of the Des W thickener lower than the normalized viscosity of the HDI thickener.

TABLE 2

METHYL-β-CD WT%	THICKENER VISCOSITY (cps)					
	HEUR5 w/ DES W at 20% Solids (Ex 5)	HEUR3 w/ HDI at 20% Solids (Ex 6)	HEUR6 w/ DES W at 20% Solids (Ex 7)	HEUR7 w/ HDI at 20% Solids (Ex 8)	HEUR6 w/ DES W at 18% Solids (Ex 9)	HEUR7 w/ HDI at 18% Solids (Ex 10)
0 (comparative)	22700	44400	17200	21250	11000	14700
0.45					11300	6900
0.5	22600	12000	17800	9800		
1	18450	6250	14400	5850	10100	4050
1.35					7800	2850
1.5	14200	3750	11500	4200		
1.8					5250	
2	8900	2050	7750			
2.25					3700	
2.5	5300	1400	5250			
2.7					2300	
3	3500	800	3150			
3.5	1650	600				

With respect to Table 2, the same results are obtained. For every amount of cyclodextrin, both urethane thickeners based on HDI exhibit greater viscosity suppression than both urethane thickeners based on Des W. In no case is the viscosity (in cPs) of the Des W thickener lower than the viscosity of the HDI thickener.

With respect to Table 3, again, the very same results are obtained. For every amount of cyclodextrin, both urethane thickeners based on HDI exhibit greater viscosity suppression than both urethane thickeners based on Des W. In no case is the viscosity (in cPs) of the Des W thickener lower than the viscosity of the HDI thickener. Moreover, the same result is observed for both methyl-β-cyclodextrin and hydroxypropyl-β-cyclodextrin.

TABLE 3

METHYL-β-CD WT%	THICKENER VISCOSITY (cps)		PrOH-β-CD WT%	THICKENER VISCOSITY (cps)	
	HEUR8 w/ DES W at 18% Solids (Ex 11)	HEUR9 w/ HDI at 18% Solids (Ex 12)		HEUR8 w/ DES W at 18% Solids (Ex 13)	HEUR9 w/ HDI at 18% Solids (Ex 14)
0.5		20800	0.5		
1		9400	1		45700
1.5		5600	1.5		31300
2	17300	3500	2		21100
2.5	11100	2200	2.5	37400	17000
3	6650	1500	3	22600	13800
3.5	3100		3.5	11200	
4	2500		4	8400	
4.5	1200		4.5	2050	

TABLE 4

METHYL-β-CD WT%	THICKENER VISCOSITY (cps)		METHYL-α-CD WT%	THICKENER VISCOSITY (cps)	
	HEUR 10 w/ DES W at 20% Solids (Ex 15)	HEUR11 w/ HDI at 20% Solids (Ex 16)		HEUR10 w/ DES W at 20% Solids (Ex 17)	HEUR11 w/ HDI at 20% Solids (Ex 18)
1		14300	1		14100
2	17800	5400	2		3350
3	8350	2550	3	13300	1600
4	2500		4	2750	

With respect to Table 4, again, the very same results are obtained. For every amount of cyclodextrin, both urethane thickeners based on HDI exhibit greater viscosity suppression than both urethane thickeners based on Des W. In no case is the viscosity (in cPs) of the Des W thickener lower than the viscosity of the HDI thickener. Moreover, the same result is observed for methyl-α-cyclodextrin.

In response Applicant's unequivocal demonstration of unexpected results, also presented in Applicant's amendment of 5/6/09, the Examiner states:

> First of all, given that the viscosity modification depends on the interaction between the hydrophobic moieties of the thickener and the cyclodextrin, some variation is to be expected. It does not appear this difference seen in comparing two species are of statistical and practical significance. It could be that there are similar variations between various cyclic species or various non-cyclic species. Furthermore, the extrapolation of these supposed unexpected results using 1,6-

> hexamethylene diisocyanate to the other three recited diisocyanates and to all cyclodextrins appears to be rather arbitrary.
>
> (Office Action of 8/18/09, p. 4, second par.)

Applicants respectfully traverse, and will now discuss each of the Examiner's statements in turn. The fact that variation is expected in any experimental data does not in any way negate the Applicant's case for unexpected results. In *each and every example* comparing the viscosity-suppressing effect of a cyclodextrin on a urethane thickener derived from 1,6-hexamethylenediisocyanate (HDI) to one derived from 4,4'-methylene-bis(isocyanatocyclohexane), the viscosity reduction with the urethane thickener derived from HDI is always greater than the viscosity reduction with the urethane thickener derived from 4,4'-methylene-bis(isocyanatocyclohexane). It is significant that this comparative relationship consistently holds despite expected experimental variation, i.e. the viscosity suppression effect is consistently greater than any experimental variation.

The Examiner states that "[i]t does not appear that this difference seen in comparing two species are of statistical and practical significance". Applicants respectfully traverse. These results have tremendous practical, and therefore commercial, significance. The results mean that lower amounts of urethane thickeners can be used when they are based on straight chain or branched acyclic diisocyanates, which will lead to lower cost paint formulations, for example. Applicants also submit that the results are statistically significant. If the difference in viscosity suppresion between the two types of urethane thickeners was not statistically significant, there would be a more or less equal number of results where viscosity suppression was greater with one urethane thickener and where viscosity suppression was greater with the other urethane thickener. The fact that the thickener based on HDI consistently shows greater viscosity suppression is strong evidence that the result is in fact statistically significant.

The Examiner also states, "the extrapolation of these supposed unexpected results using 1,6-hexamethylene diisocyanate to the other three recited diisocyanates and to all cyclodextrins appears to be rather arbitrary". Applicants respectfully traverse. The selection of the the other three recited diisocyanates was not aribitrary or random in any way, but based on a sound conclusion reached by careful review of the data of record. HDI is a *straight chain* diisocyanate

exhibiting surprising and unexpected high viscosity suppression with cyclodextrins. Since the comparative data was obtained with a urethane thickener based on a *cyclic diisocyanate*, the aliphatic group of the diisocyanate determines the relative viscosity suppression effect of the cyclodextrin. Since higher viscosity suppression was obtained with a straight chain diisocyanate (HDI), than a cyclic diisocyanate (4,4'-methylene-bis(isocyanatocyclohexane)), it is a very reasonable conclusion that a straight chain (as opposed to a cyclic group) is the key structural feature responsible for the viscosity suppression effect. HDI has a six-carbon chain. 2,2,4-Trimethyl-1,6-diisocyanatohexane also has a six-carbon chain, but is branched with three methyl groups. Applicants submit that it is reasonable to extrapolate the results from a straight six-carbon chain to a branched six-carbon chain. Applicants submit that it is also reasonable to extrapolate the same viscosity effect to a carbon chain having two less carbon atoms (1,4-tetramethylene diisocyanate) and to a carbon chain having four more carbon atoms (1,10-decamethylene diisocyanate) than HDI. Applicants submit that it is very reasonable to extrapolate this surprising effect to structurally similar homologs.

With respect to extrapolation of the unexpected results to other cyclodextrins, data is reproduced above showing that the same enhanced viscosity suppression effect is observed for hydroxypropyl-β-cyclodextrin (different substituent, Table 3) and methyl-α-cyclodextrin (different ring size, Table 4) as well as methyl-β-cyclodextrin in the other examples. Hydroxypropyl-β-cyclodextrin is significantly more polar than its parent compound β-cyclodextrin, and methyl-β-cyclodextrin and methyl-α-cyclodextrin have significantly different ring sizes and therefore internal cavitands. Applicants submit that the observation of similar viscosity suppression results for these structurally different (both in size and polarity) cyclodextrins provides sufficient support to extrapolate this effect to all cyclodextrins.

The Examiner states, "[i]t could be that there are similar variations between various cyclic species or various non-cyclic species." Applicants submit that with no supporting data, this statement is highly speculative. Even if it were true, it would not alter the conclusion reached by the Applicant based on the results of record, i.e. that viscosity supression for urethane thickeners based on straight chain diisocyanates is greater than viscosity suppression for urethane thickeners based on cyclic diisocyanates.

For all of the foregoing reasons, reconsideration and removal of the rejection of claim 29 under 35 U.S.C. § 103(a), as allegedly unpatentable over Eisenhart in view of Emmons is respectfully requested.

Claim 1 stands rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Eisenhart *et al.*, U.S. Patent No. 5,137,571 (hereafter "Eisenhart") in view of Emmons *et al.*, U.S. Patent No. 4,079,028 (hereafter "Emmons") and further in view of Lau *et al.,* U.S. Patent No. 5,376,709 (hereafter "Lau '709") and Lau *et al.*, U.S. Patent No. 5,521,266 (hereafter "Lau '266"). Applicants respectfully traverse this rejection.

Eisenhart and Emmons are discussed above.

Lau '709 generally discloses an improved method for reversibly suppressing the viscosity of an aqueous solution containing a hydrophobically modified thickener by first complexing the thickener with methyl-β-cyclodextrin and then decomplexing the thickener (Abstract). The thickener is decomplexed by the addition of a surface active agent (anionic, nonionic, and cationic surfactants) or by the addition of water soluble organic solvents (e.g. ethanol or Texanol® (col. 4, ll. 3-20).

Lau '266 generally discloses an aqueous polymerization method comprising the steps of (1) complexing at least one monomer having low water solubility with a macromolecular organic compound having a hydrophobic cavity and (2) polymerizing in an aqueous system 0.1-100% of the complexed monomer with 0-99.9% of a monomer having high water solubility (Abstract). The macromolecular organic compound can be cyclodextrin or a cyclodextrin derivative. Suitable cyclodextrin derivatives are methyl, triacetyl, hydroxypropyl, and hydroxyethyl derivatives of α-, β-, and γ-cyclodextrin. Methyl-β-cyclodextrin if the preferred derivative (col. 3, ll. 51-62). Methyl-β-cyclodextrin is used exclusively in the examples, and there is no mention of urethane thickeners.

The Examiner states:

> Eisenhart teaches the general concept of using a variety of cyclodextrins—alpha, beta and gamma, unmodified and modified – in combination with hydrophobically modified associative thickeners to eliminate the use of organic cosolvents and surfactants necessary to prepare aqueous compositions. See col 1, lines 18-51.

(Office Action of 8/18/09, p. 5, first par.) Applicants respectfully request clarification. A careful reading shows that cyclodextrins are not mentioned anywhere in the cited passage.

The Examiner further states that:

> Furthermore, Eisenhart teaches the use of unmodified α-, β- and γ-cyclodextrins, as well as generically modified α-, β- and γ-cyclodextrins. Therefore, in view of the teaching of Lau '709 regarding the utility of methyl-β-cyclodextrin, it would be further obvious to modify the combination of Eisenhart and Emmons by the use of any available modified cyclodextrin, such as methyl-α-cyclodextrin, disclosed by Lau '266, with a reasonable expectation of success.

Applicants respectfully traverse. The Applicant can find no reference to generically modified α-, β- and γ-cyclodextrins anywhere in Eisenhart. Instead, Eisenhart specifically teaches modified cyclodextrins that are more water-soluble than the corresponding unmodified compounds. In particular, Eisenhart teaches hydroxyethyl- and hydroxypropyl-modified cyclodextrins, without specifying whether they are the α-, β- or γ- forms (col. 3, ll. 50-63):

> Applicants have found that not only can the alpha, beta and gamma cyclodextrins be used effectively as transient viscosity suppressing agents for hydrophobic associative thickeners, but that modified cyclodextrins, such as for example those cyclodextrins produced by the process described in UK Patent application 2,189,245 A, which are more soluble in water than the unmodified cyclodextrin compounds can also be employed in this manner. In fact applicants have found it preferable to utilize hydroxyethyl- or hydroxypropyl-cyclodextrins having a higher degree of water solubility 60 than the unmodified cyclodextrins for use with aqueous solutions containing high concentrations of associative thickener.

Moreover, since Eisenhart teaches water-soluble cyclodextrins, Eisenhart teaches *away* from methyl cyclodextrins such as methyl-α-cyclodextrins. The skilled person in the art will know that methyl cyclodextrins are formed by replacement of polar hydroxyl groups of unmodified cyclodextrins with non-polar methyl ether groups, and will expect that this substitution will make the resulting methyl cyclodextrins considerably less polar, and therefore less water-soluble, than the unmodified cyclodextrins. Thus, Eisenhart's teaching of water-soluble cyclodextrins that are *more* water-soluble is a clear teaching *away* from methyl cyclodextrins. Since Eisenhart teaches away from methyl cyclodextrins, the use of methyl-α-cyclodextrin in the composition is *not* obvious.

Lau '266 teaches a polymerization method, not a composition for viscosity suppression of urethane thickeners. Lau '266 is silent on *polyurethane* thickeners, and offers no hint or

suggestion that methyl-α-cyclodextrin is suitable for viscosity suppression of *urethane* thickeners. Lau '709 discloses polyurethane thickeners, but is silent on the chemical structure of the polyurethane thickeners disclosed therein.

In response, the Examiner states:

> It is noted that although the reference [Lau '266] teaches this polymerization method, it further teaches that the polymers so prepared can be used as associative thickeners and specifically citing Eisenhart: "This patent discloses a method of suppressing the viscosity of associative thickeners using cyclodextrins and cyclodextrin derivatives. After the solution copolymers of the present invention are formed, but before they are decomplexed from the cyclodextrin or cyclodextrin derivative, the solution copolymers may be added directly into a coating composition and decomplexed therein."

(Office Action of 8/18/09, p. 6, first par.) The polymers prepared in Lau '266 are solution copolymers formed from (meth)acrylate monomers. Thus they are (meth)acrylic copolymers, *not urethane thickeners*. The paragraph cited by the Examiner also has the statement, "[s]olution copolymers produced by the method of this invention which act as associative thickeners may beneficially [be] used as described in U.S. Patent No. 5,137,571" (col. 6, ll. 46-48). This statement is a teaching that the (meth)acrylic copolymers of Lau '266 may be used as associative thickeners. It is *not* a teaching or suggestion that *urethane thickeners* may be used with methyl-α-cyclodextrin. Moreover, as set forth above, Eisenhart teaches hydroxyethyl- and hydroxypropyl-substituted cyclodextrins, not methyl- α-cyclodextrin, so the reference to Eisenhart by Lau '266 can not be construed as a teaching of the use of methyl-α-cyclodextrin.

Applicants submit that no motivation to replace the methyl-β-cyclodextrin of Lau '709 with methyl-α-cyclodextrin can be found in either Lau '709 or Lau '266. As set forth above, Lau '266 teaches an aqueous polymerization method suitable for polymerizing monomers with low water solubility by complexing them cyclodextrins. There is no mention of urethane thickeners in Lau '266, and no hint or suggestion that the methyl-α-cyclodextrin is suitable for suppressing the viscosity of urethane thickeners. At best, Lau '266 serves as a disclosure for the existence of methyl-α-cyclodextrin.

Moreover, it is not obvious to substitute methyl-β-cyclodextrin with methyl-α-cyclodextrin. Although they are both composed of α-D-glucopyranoside units, they are quite different in their physical structures. Methyl-α-cyclodextrin is composed of six glucopyranoside

units arranged in a ring, while methyl-β-cyclodextrin is composed of seven glucopyranoside units arranged in a ring. As such, the size of the hydrophobic cavities inside the toroidal physical structures of the molecules are quite different, with the diameter of the methyl-β-cyclodextrin cavity being necessarily larger than the diameter of the methyl-α-cyclodextrin cavity. Also, their physical properties are markedly different. For example, methyl-β-cyclodextrin has a water solubility of only 18.5 g/L, while methyl-α-cyclodextrin has a water solubility of 145 g/L (http://en.wikipedia.org/wiki/Cyclodextrin). Since the viscosity suppression effect of these cyclodextrins depends upon the hydrophobe moiety of the urethane thickener filling the hydrophobic cavity, their can be no expectation *a priori* that methyl-β-cyclodextrin and methyl-α-cyclodextrin, with different size hydrophobic cavities and widely divergent water solubilities, will both have hydrophobic cavities of suitable sizes to complex the terminal phobes of the urethane thickeners, and therefore be effective in viscosity suppression of polyurethane thickeners.

In response, the Examiner states, "[t]his is not found persuasive because as noted previously, Eisenhart teaches the use of unmodified α-, β - and γ-cyclodextrins, as well as generically modified α-, β - and γ-cyclodextrins for viscosity suppression" (Office Action of 8/18/09, p. 6, last par.). Applicants respectfully traverse. As set forth above, Eisenhart does *not* teach generically modified α-, β - and γ-cyclodextrins for viscosity suppression. Instead, Eisenhart specifically teaches modified cyclodextrins that are more water-soluble than the corresponding unmodified compounds. In particular, Eisenhart teaches hydroxyethyl- and hydroxypropyl-modified cyclodextrins, without specifying whether they are the α-, β- or γ- forms (col. 3, ll. 50-63)

Even if a *prima facie* case of obviousness is made, surprising results are obtained with methyl-α-cyclodextrin. Not only is methyl-α-cyclodextrin effective in the viscosity suppression of urethane thickeners despite the smaller size of its hydrophobic cavity, but the viscosity suppression of methyl-α-cyclodextrin is even greater than that of methyl-β-cyclodextrin when the urethane thickener is derived from HDI. Reference is made to Examples 15-18 (pp. 12-13), the results of which are summarized in Table 4 on p. 13 and reproduced below.

TABLE 4

METHYL-β-CD WT%	THICKENER VISCOSITY (cps)			METHYL-α-CD WT%	THICKENER VISCOSITY (cps)	
	HEUR 10 w/ DES W at 20% Solids (Ex 15)	HEUR11 w/ HDI at 20% Solids (Ex 16)			HEUR10 w/ DES W at 20% Solids (Ex 17)	HEUR11 w/ HDI at 20% Solids (Ex 18)
1		14300		1		14100
2	17800	5400		2		3350
3	8350	2550		3	13300	1600
4	2500			4	2750	

At concentrations of 1, 2, and 3 wt%, lower viscosity is obtained with the HDI-based urethane thickener in the presence of methyl-α-cyclodextrin than in the presence of methyl-β-cyclodextrin. This viscosity is 38% lower at 2 wt% and 37% lower at 3 wt%. It is highly unlikely that the large differences of 38% and 37% at 2 and 3 wt% are due to random variation.

The Examiner further notes that:

> Applicant further objects to the combination of references including Emmons because it appears to be Applicant's position that this reference concentrates on cyclic diisocyanates. It is not cleat that this is relevant to a claim wherein over half of the diisocyanates are cyclic. Likewise for the purported unexpected results seen in thickeners derived from straight chain/branched chain vs. cyclic diisocyanates. (Office Action of 8/18/09, p. 6, par. 2) Applicants apologize for this confusion. Applicant intended that this argument be directed toward claim 29, which does not recite cyclic diisocyanates, not claim 1.

For all of the reasons set forth above, reconsideration and removal of the rejection of claim 1 under 35 U.S.C. § 103(a), as allegedly unpatentable over Eisenhart in view of Emmons and in further view of Lau '709 and Lau '266 is respectfully requested.

Double Patenting

Claims 16, 17 and 29 stand rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 4 of Harris *et al.*, U.S. Patent No. 7,125,919 (hereafter "Harris") in view of Emmons. The Examiner states that although the conflicting claims are not identical, they are not patentably distinct from each other. Applicants respectfully

traverse. Applicants have herein amended claims 16 and 17 to depend from allowed claim 13. Since claims 16 and 17 now recite all the limitations of allowed claim 13, Applicant submits that these claims are now allowable. Reconsideration and removal of the double patenting rejection of claims 16 and 17 is therefore requested. The Applicant's arguments with respect to claim 29 are set forth below.

The relevant claims of Harris are reproduced below:

> 1. A tinting composition comprising:
> a) at least one colorant composition; and
> b) from 0.05 to 15 % dry weight of at least one additive based on the weight of said at least one colorant composition,
> wherein said additive comprises at least one highly shear thinning associative thickener, at least one moderately shear thinning associative thickener, and at least one macromolecular organic compound having a hydrophobic cavity.
>
> 4. The tinting composition according to claim 1, wherein said highly shear thinning associative thickener comprises a hydrophobically modified alkali soluble polymer, and wherein said moderately shear thinning associative thickener comprises a nonionic hydrophobically modified ethylene oxide urethane block copolymer.

Harris generally discloses a tinting composition containing at least one colorant and 0.05 to 15% dry weight of at least one additive selected from associative thickeners and macromolecular compounds having a hydrophobic cavity (col. 2, ll. 38-43). Examples of associative thickeners include nonionic hydrophobically modified ethylene oxide urethane block copolymers (col. 4, ll. 40-45). Examples of macromolecular compounds having a hydrophobic cavity are cyclodextrins. Cyclodextrin derivatives are α-,β-, and γ-cyclodextrins in which at least one hydroxyl group located on the rim of the cyclodextrin ring has been functionalized with a substituent group such as methyl, acetyl, hydroxypropyl, and hydroxyethyl groups (col. 6, ll. 4-24). Methyl-β-cyclodextrin is the preferred cyclodextrin (col. 6, ll. 23-24).

Emmons is discussed above. The Examiner concedes that the "claims [of Harris] do not recite particular hydrophobically modified ethylene oxide urethane block copolymers."

The Examiner alleges, however that:

> It would have been obvious to one having ordinary skill in the art at the time the invention was made to prepare the recited composition with cyclodextrins because they are disclosed in the written description of "macromolecular organic compound having a hydrophobic cavity." It would be further obvious to select any

> hydrophobically modified ethylene oxide urethane block copolymer known to have utility for the preparation of tinting compositions, such as paint. In doing so, one of ordinary skill would arrive at the instant invention with a reasonable expectation of success.

(Office Action of 8/18/09, p. 7, fourth par.) Applicants respectfully traverse. The discussion of the patentability of claim 29 over Eisenhart in view of Emmons in the preceding section of this paper applies to the double patenting rejection of claim 29 as well. There is no suggestion in Harris that the urethane thickeners disclosed therein have "at least one urethane linkage formed from a diisocyanate comprising 1,4-tetramethylene diisocyanate, 1,6-hexamethylene diisocyanate, 1,10-decamethylene diisocyanate, 2,2,4-trimethyl-1,6-diisocyanatohexane, and a combination comprising at least one of the foregoing diisocyanates" as recited by claim 29. There is no motivation to select these particular diisocyanate precursors from the disclosure of Emmons to arrive at claim 29. Moreover, Applicants have clearly demonstrated that surprising and unexpected results are obtained when the associative thickeners are derived from straight chain and branched chain diisocyanates as opposed to cyclic or polycyclic diisocyanates. Therefore reconsideration and removal of the nonstatutory obviousness-type double patenting rejection of claim 29 is respectfully requested.

Claims 16, 17 and 29 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 3 of Tanzer *et al.*, U.S. Patent No. 6,887,928 (hereafter "Tanzer") in view of Emmons. The Examiner states that although the conflicting claims are not identical, they are not patentably distinct from each other. Applicants respectfully traverse. Applicants have herein amended claims 16 and 17 to depend from allowed claim 13. Since claims 16 and 17 now recite all the limitations of allowed claim 13, Applicant submits that these claims are now allowable. Reconsideration and removal of the double patenting rejection of claims 16 and 17 is therefore requested. The Applicant's arguments with respect to claim 29 are set forth below.

The relevant claims of Tanzer are reproduced below:

> 1. A method of improving the viscosity stability of a coating composition upon the addition of a colorant component, comprising the steps of:
> a) providing a base paint; and

b) adding to said base paint, a tinting composition comprising:
i) at least one colorant composition; and
ii) from 0.05 to 15% dry weight of at least one macromolecular compound having a hydrophobic cavity, based on the weight of said at least one colorant composition.

3. The method according to claim 1 or 2 wherein said base paint comprises at least one associative thickener selected from the group consisting of nonionic hydrophobically modified ethylene oxide urethane block copolymer, hydrophobically modified alkali soluble polymer, hydrophobically modified cellulosic, hydrophobically modified polyacrylamide, and mixtures thereof.

Tanzer generally discloses a tinting composition containing at least one colorant and 0.05 to 15% dry weight of at least one additive selected from associative thickeners and macromolecular compounds having a hydrophobic cavity (col. 2, ll. 36-41). Examples of associative thickeners include nonionic hydrophobically modified ethylene oxide urethane block copolymers (col. 4, ll. 17-21). Examples of macromolecular compounds having a hydrophobic cavity are cyclodextrins. Cyclodextrin derivatives are α-,β-, and γ-cyclodextrins in which at least one hydroxyl group located on the rim of the cyclodextrin ring has been functionalized with a substituent group such as methyl, acetyl, hydroxypropyl, and hydroxyethyl groups (col. 4, ll. 32-53). Methyl-β-cyclodextrin is the preferred cyclodextrin (col. 4, ll. 52-53).

Emmons is discussed above. The Examiner concedes that the "claims [of Tanzer] do not recite particular hydrophobically modified ethylene oxide urethane block copolymers." The Examiner alleges, however, that:

> It would have been obvious to one having ordinary skill in the art at the time the invention was made to prepare the recited composition with cyclodextrins because they are disclosed in the written description of "macromolecular organic compound having a hydrophobic cavity." It would be further obvious to select any hydrophobically modified ethylene oxide urethane block copolymer known to have utility for the preparation of tinting compositions, such as paint. In doing so, one of ordinary skill would arrive at the instant invention with a reasonable expectation of success.

(Office Action of 8/18/09, p. 8, fourth par.) Applicants respectfully traverse for the same reasons as set forth above for the double patenting rejection over Harris in view of Emmons. Therefore reconsideration and removal of the nonstatutory obviousness-type double patenting rejection of claim 29 is respectfully requested.

Claims 16, 17 and 29 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1 of Lau '709 in view of Emmons. The Examiner states that although the conflicting claims are not identical, they are not patentably distinct from each other. Applicants respectfully traverse. Applicants have herein amended claims 16 and 17 to depend from allowed claim 13. Since claims 16 and 17 now recite all the limitations of allowed claim 13, Applicant submits that these claims are now allowable. Reconsideration and removal of the double patenting rejection of claims 16 and 17 is therefore requested.

The Applicant's arguments with respect to claim 29 are set forth below.

Claim 1 of Lau '709 is as follows:

1. A method for eliminating the need for organic solvents by hydrophobic thickeners useful for thickening aqueous systems containing a water-insoluble polymer, comprising:
   a) admixing methyl-β-cyclodextrin having hydrophobic groups with a hydrophobic thickener selected from the group consisting of hydrophobically modified polyethyloxylated urethanes, hydrophobically modified alkali soluble emulsions, hydrophobically modified cellulose, and hydrophobically modified polyacrylamides, where said methyl-β-cyclodextrin is admixed in an amount effective to complex the hydrophobic groups of said methyl-β-cyclodextrin with the hydrophobic groups of said hydrophobic thickener;
   b) adding said complexed admixture to said aqueous system containing a water-insoluble polymer; and
   c) adding to said aqueous system containing said complexed admixture and said water-insoluble polymer, a surfactant selected from the group consisting of an anionic, nonionic and cationic surfactant, where said surfactant is added in an amount effective to decomplex the hydrophobic groups of said methyl-β-cyclodextrin from the hydrophobic groups of said hydrophobic thickener.

Lau '709 and Emmons are discussed above. The Examiner characterizes the claims of Lau as being "drawn to a method for eliminating the need for organic solvents in a composition comprising a hydrophobic thickener, such as generic hydrophobically modified polyethoxylated urethane by the addition of methyl-β-cyclodextrin", and concedes that "The claims do not recite

particular hydrophobically modified ethylene oxide urethane block copolymers." The Examiner alleges, however that:

> It would have been obvious to one having ordinary skill in the art at the time the invention was made to carry out the reference method for elimination of organic solvent using a thickener know to require the addition of an organic solvent as a viscosity modifier with a reasonable expectation of success. In doing so, the artisan would arrive at the instant composition.

(Office Action of 8/18/09, p. 9, fourth par.) Applicants respectfully traverse. The foregoing discussions on the patentability of claim 29 over Harris in view of Emmons, and over Tanzer in view of Emmons apply equally to this rejection. Therefore reconsideration and removal of the nonstatutory obviousness-type double patenting rejection of claim 29 is respectfully requested on the same grounds as presented above.

Claims 16, 17 and 29 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 2 of Eisenhart in view of Emmons. Claim 1 is rejected further in view of Lau '709 and Lau '266. The Examiner states that although the conflicting claims are not identical, they are not patentably distinct from each other. Applicants respectfully traverse. Applicants have herein amended claims 16 and 17 to depend from allowed claim 13. Since claims 16 and 17 now recite all the limitations of allowed claim 13, Applicant submits that these claims are now allowable. Reconsideration and removal of the double patenting rejection of claims 16 and 17 is therefore requested. The Applicant's arguments with respect to claims 1 and 29 are set forth below.

The relevant claims of Eisenhart are reproduced below:

1. A method for eliminating the need for organic solvents by hydrophobic thickeners useful for thickening aqueous systems containing a water-insoluble polymer, comprising:
   a) admixing a cyclodextrin-containing compound having hydrophobic groups with a hydrophobic thickener selected from the group consisting of hydrophobically modified polyethyloxylated urethanes, hydrophobically modified alkali soluble emulsions, hydrophobically modified cellulose, and hydrophobically modified polyacrylamides where said cyclodextrin-containing compound is admixed in an amount effective to complex the hydrophobic groups of said cyclodextrin-containing compound with the hydrophobic groups of said hydrophobic thickener;

b) adding said complexed admixture to said aqueous system containing a water-insoluble polymer; and
c) adding to said aqueous system containing said complexed admixture and said water-insoluble polymer, a compound having an affinity for the cyclodextrin-containing compound wherein said compound is an anionic, nonionic and cationic surfactant and where said compound is added in an amount effective to decomplex the hydrophobic groups of said cyclodextrin-containing compound from the hydrophobic groups of said hydrophobic thickener.

2. The method of claim 1 wherein said cyclodextrin-containing compound is selected from the group consisting of alpha, beta and gamma cyclodextrin and ethoxylated and propoxylated cyclodextrins.

All of the cited references are discussed above. The Examiner characterizes the claims of Eisenhart as being "drawn to a method for eliminating the need for organic solvents in a composition comprising a hydrophobic thickener, such as generic hydrophobically modified polyethoxylated urethane by the addition of a cyclodextrin", and concedes that "[t]he claims do not recite particular hydrophobically modified ethylene oxide urethane block copolymers." The Examiner alleges however, that:

> It would have been obvious to one having ordinary skill in the art at the time the invention was made to carry out the reference method for elimination of organic solvent using a thickener know to require the addition of an organic solvent as a viscosity modifier with a reasonable expectation of success. In doing so, the artisan would arrive at the instant composition.

With respect to claim 1, the Examiner alleges that:

> Lau '709 and Lau '266 teach as set forth above. The claims recite the use of unmodified α-, β-, and λ-cyclodextrins, as well as modified α-, β-, and λ-cyclodextrins. Therefore, in view of the teaching of Lau '709 regarding the utility of methyl-β-cyclodextrin, it would be further obvious to modify the combination of Eisenhart and Emmons by the use of any available modified cyclodextrin, such as methyl-α-cyclodextrin, disclosed by Lau, '266, with a reasonable expectation of success.

Applicants respectfully traverse both rejections. The grounds for these rejections are identical to the grounds for the rejection of these claims as obvious under § 103, and the rejections are addressed by the Applicant in the preceding section. Therefore reconsideration and

removal of the nonstatutory obviousness-type double patenting rejections of claims 1 and 29 is respectfully requested on the same grounds as presented above.

It is believed that the foregoing amendments and remarks fully comply with the Office Action and that the claims herein should now be allowable to Applicants. Accordingly, reconsideration and allowance are requested.

If there are any additional charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 06-1130.

Respectfully submitted,

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